

- Hemoglobin (Hb)
 - Will bind:
 - Oxygen (4/Hb)
 - Hydronium ions (allosteric)
 - Carbon dioxide (allosteric)
 - DPG (from glycolysis, allosteric)
 - Carbon monoxide (competitively with oxygen)
 - Contributes to blood's buffering capabilities
- Albumin
 - Present in plasma
 - Maintains osmolarity of plasma
 - Maintains blood pressure and pH
 - Removes Hydronium ions
 - Contributes to blood's buffering capabilities
- Immunoglobulin
 - Present in plasma
 - Regulates blood pressure and pH
 - Provides immunity
- Fibrinogen
 - Present in plasma
 - Activated by Thrombin
- Thrombin
 - Activates Fibrinogen
 - Synthesized by Vitamin K (nonpolar vitamin)
- Fibrin
 - Provides clotting in hemostasis
- Prostacyclin
 - Released by healthy endothelial cells during hemostasis
 - Interferes with stopped platelet recruitment
- Plasminogen
 - Activated by
- Plasmin
 - Solubilizes Fibrin, destroys clot
 - Helps in orderly breakup of clot
 - Prevents Ischemic Hypoxia (i.e. stroke)
- Bilirubin
 - Created as a result of recycling RBCs
 - Excreted through urine, feces or intestines
 - May cause jaundice if not excreted properly
 - Could turn plasma yellow

- Erythropoietin
 - Kidney endocrine
 - Component in RBC synthesis
 - Released as a result of low [oxygen]
 - Triggers RBC synthesis in the bone marrow
 - Too much erythropoietin may cause polycythemia
 - Insufficient erythropoietin released may cause renal anemia
- Folic Acid
 - Component in RBC synthesis
- Iron
 - Component in RBC synthesis
 - Needed for some enzyme activity
 - Can be sequestered by liver
 - Will pull iron out from blood when sick to drive away pathogens seeking that iron.
 - Epithelial cells regulates absorption (10%)
 - May increase above 10% if need more and decrease as necessary
- Vitamin B12
 - Polar vitamin
 - Component in RBC synthesis
 - Inability to absorb vitamin B12 is called pernicious anemia (may be caused by inability of parietal cells to release intrinsic factor)
 - Intrinsic factor released by parietal cells is added to the bolus and binds to vitamin B12 so the ileum will be able to absorb the vitamin B12.
- Insulin
 - Provides nutrients for growth hormone
 - Promotes somatic growth
 - Regulates the absorptive state
 - Prepares body to work with nutrients
 - Either use nutrients immediately
 - Or store them away for later (glycogen, triglycerides, proteins)
- Calcium
 - Required for:
 - Release of neurotransmitters
 - Cross bridge cycling
 - binding to troponin in skeletal muscle (from the SR)
 - binding to calmodulin in smooth muscle (from the IF)
 - binding to troponin and to ligand-gated calcium channels on the SR in cardiac muscle (from voltage gated channels on the TTs)
 - Increase bone strength

- Reduce the likelihood of heart problems
 - Stimulates the exocytosis of neurotransmitters
 - Released by voltage-gated channels in the cochlea; calcium influx then causes the release of neurotransmitters which then proceed to the afferent neuron and then to the brain.
- Potassium
 - Influxes into the cochlea via mechanically gated channels responding to noise (stereocilia bending); influx of potassium changes the membrane potential which causes voltage-gated calcium channels to open.
- Vitamin D
 - Nonpolar vitamin
 - Allows for calcium absorption in the gastrointestinal tract
 - Synthesized by UV radiation of a precursor molecule found in the skin
 - Converted to the active form (1,25 - Dihydroxyvitamin D) in the liver and kidney; conversion is regulated by the parathyroid gland
- 1,25 - Dihydroxyvitamin D (calcitriol)
 - created by the kidney (via PTH stimulation) and the liver
 - stimulates intestinal tract allowing calcium absorption
 - without the active form of vitamin D, no calcium will be absorbed regardless of intake amount.
 - A problem with either the liver or the kidney could lead to no active vitamin D
- Vitamin E
 - Nonpolar vitamin
- Gonadotropin Releasing Hormone (GnRH)
 - Releases luteinizing hormone
 - Releases follicle stimulating hormone
- Cortisol
 - Produced as a result of "stress"
 - Metabolic endocrine
 - Mainly impacts liver function
 - Increases blood pressure
 - Increases glucose levels via:
 - Bone reabsorption
 - Fat catabolism
 - Protein catabolism
 - Inhibits immune response to save energy
 - Inhibits growth and reproduction
 - Increases smooth muscle responses to epinephrine and norepinephrine in order to improve the functions of the sympathetic nervous system
- Oxytocin
 - As a neurotransmitter